

What is claimed is:

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- 006250" E3E3" 960
1. A multi-lumen catheter comprising:
 - a) an elongated cylindrical tube having a distal and a proximal end and a lumen therethrough;
 - b) a transverse septum extending from the distal end to the proximal end of the tube within the lumen of the tube and dividing the tube into a return lumen passageway and a withdrawal passageway;
 - c) a supporting septum extending from the distal end to the proximal end of the tube and dividing the withdrawal passageway into first and second withdrawal lumens; and
 - d) a return septum extending from the distal end to the proximal end of the tube and dividing the return lumen passageway into first and second return lumens.
 2. A multi-lumen catheter according to claim 1 wherein the transverse septum includes a non-diametral septum.
 3. A multi-lumen catheter according to claim 1 wherein the supporting septum resists displacement.
 4. A multi-lumen catheter according to claim 1 wherein the withdrawal lumens have a total cross-sectional area greater than or equal to that of the total cross-sectional area of the return lumens.
 5. A multi-lumen catheter according to claim 1 wherein the withdrawal lumens have a combined flow resistance less than or equal to the combined flow resistance of the return lumens so that the total flow rate for blood flowing through the withdrawal lumens does not create a pressure differential sufficient to cause the withdrawal lumens to collapse.
 6. A multi-lumen catheter according to claim 1 wherein the distal end includes first and second beveled surfaces angled away from one another.

7. A multi-lumen catheter according to claim 6 wherein the withdrawal lumens have distal ends disposed at the first beveled surface and the return lumens have distal ends disposed at the second beveled surface to reduce the mixing of blood between the return lumens and the withdrawal lumens.

8. A multi-lumen catheter according to claim 1 wherein the withdrawal lumens and the return lumens have cross-sectional shapes that are substantially devoid of sharp angles that are less than 90 degrees.

9. A multi-lumen catheter according to claim 1 comprising an external flow coupler connecting the withdrawal lumens of the catheter to an external withdrawal tube and connecting the return lumens of the catheter to an external return tube.

10. A multi-lumen catheter according to claim 1 wherein the catheter is an indwelling catheter.

11. A multi-lumen catheter comprising:

- a) an elongated cylindrical tube having a distal and a proximal end and a lumen therethrough;
- b) a transverse septum extending from the distal end to the proximal end of the tube within the lumen of the tube and dividing the tube into a return passageway and a withdrawal passageway, the withdrawal and return passageways open at the distal and proximal ends of the tube; and
- c) a supporting septum extending from the distal end to the proximal end of the tube and dividing the withdrawal passageway into first and second withdrawal lumens.

12. A multi-lumen catheter according to claim 11 wherein the transverse septum includes a non-diametral septum.

13. A multi-lumen catheter according to claim 11 wherein the supporting septum resists vertical displacement.

14. A multi-lumen catheter according to claim 11 wherein the catheter is an indwelling catheter.

15. A multi-lumen catheter according to claim 11 comprising a return septum extending from the distal end to the proximal end of the tube and dividing the return passageway into first and second return lumens.

16. A multi-lumen catheter according to claim 15 wherein the return septum resists vertical displacement.

17. A multi-lumen catheter according to claim 15 wherein the withdrawal lumens have a total cross-sectional area greater than or equal to that of the total cross-sectional area of the return lumens.

18. A multi-lumen catheter according to claim 15 wherein the withdrawal lumens have a combined flow resistance less than or equal to the combined flow resistance of the return lumens so that the total flow rate for blood flowing through the withdrawal lumens does not create a pressure differential sufficient to cause the withdrawal lumens to collapse.

19. A multi-lumen catheter according to claim 15 wherein the distal end includes first and second beveled surfaces angled away from one another.

20. A multi-lumen catheter according to claim 19 wherein the withdrawal lumens have distal ends disposed at the first beveled surface and the return lumens have distal ends disposed at the second beveled surface to reduce the mixing of blood between the return lumens and the withdrawal lumens.

21. A multi-lumen catheter according to claim 15 wherein the withdrawal lumens and the return lumens have cross-sectional shapes that are substantially devoid of sharp angles that are less than 90 degrees.

22. A multi-lumen catheter according to claim 15 comprising an external flow coupler connecting the withdrawal lumens of the catheter to an external withdrawal tube and connecting the return lumens of the catheter to an external return tube.

23. A multi-lumen catheter according to claim 11 wherein the return passageway comprises a single return lumen.

24. A multi-lumen catheter according to claim 23 wherein the withdrawal lumens have a total cross-sectional area greater than or equal to that of the return lumen.

25. A multi-lumen catheter according to claim 23 wherein the withdrawal lumens have a combined flow resistance less than or equal to the flow resistance of the return lumen so that the total flow rate for blood flowing through the withdrawal lumens does not create a pressure differential sufficient to cause the withdrawal lumens to collapse.

26. A multi-lumen catheter according to claim 23 wherein the distal end includes first and second beveled surfaces angled away from one another and wherein the withdrawal lumens have distal ends disposed at the first beveled surface and the return lumen has a distal end disposed at the second beveled surface to reduce the mixing of blood between the return lumen and the withdrawal lumens.